XIII. Appendices

Appendix A: Information in the primary data set.

For each lot of 35 head or more purchased by the sample plants between early February 1995 through mid May 1996:

Unique number identifying the lot.
Identity of the purchasing plant.
Purchase date
Kill date
Identity and location of the seller
Number of head in lot
Whether the lot consisted of steers, heifers, steers and heifers mixed, or dairy cattle
Procurement method (forward contract, packer fed, marketing agreement, or spot)
Pricing method (carcass, formula carcass, live, formula live)
If formula priced, the particular formula used.
Total live weight of the lot
Total hot weight of the lot
Total cost delivered
FOB feedyard live cost for spot transactions
Percent of lot graded prime and choice combined
Percent of lot graded select and others combined
Percent of lot falling in each of five yield grade categories
Number of head condemned
Miles cattle shipped

Appendix B: Evidence on the scheduling of marketing agreement (formula) cattle.

1. O. Dean Alexander reporting May 11, 1995 conversation with

   Terms of agreements with

   does not guarantee any numbers. has complete discretion over how many cattle to sell and when to sell them. at least 8 days notice before sending cattle. said that their notice rarely ever goes beyond the 8 days."

2.

   "All formula feeders/customers will notify the head buyer at each plant on the 20th day of the month prior to shipment, of the approximate number of cattle they plan to ship the following month. The formula feeder/customer will then notify the head buyer on Thursday two weeks prior to shipment of the actual head count for the applicable week. For example, if a feeder thinks that he will have 1000 head to kill in April, he will notify the head buyer at the plant on or before the 20th of March. Then, if he wants to kill 245 head (of the 1000 head estimated) on April 19, 1995 (Wednesday), he will schedule these cattle with the head buyer on or before April 6, 1995 (Thursday)."

3. accompanying letter to P&SA from

   "Cattle shipments to be determined by by second Thursday preceding the week of shipment."

4. Harry Schaaf and Sue Ann Claudon reporting April 30, 1997 interview of

   schedules cattle for shipment and is the point man for all cattle sales. advises the packer two weeks in advance of what cattle will be shipped. can amend the figure during the following week, just as the packer can."

5. Report of November 1996 interview with

   "He calls in the formula cattle two weeks before they would be ready or finished."

6. Harry Schaaf and Angie Williams report on November 18, 1996 interview of

   "He said he provides both packers a list on Sunday for the week after next for formula cattle. Both packers have given him scheduling rights."

7. Report on interview of

   "He sells some cattle on the formula . . . There is no standard seven day pick up with the formula and the packers can schedule at any date."

8. Harry Schaaf and Angie Williams report on interview of

   turns the numbers in to the buyer on a Thursday, and these cattle will be scheduled for kill sometime during the week after next. In other words, the plant has advance notice of these cattle from 11 to 15 days."

Appendix C: Discussion of results of estimation of the plant-level spot market cattle price - non-cash supply relationship with RRATIO defined using planning horizon 1.

This appendix discusses some general aspects of the results reported in Table VII.1.1. The implications of the estimate of the coefficient of RRATIO are discussed in the body of the report. Interpretation of the estimates of the coefficients of other explanatory variables is provided here. The plant-level spot market cattle price - non-cash supply relationship was also estimated with RRATIO defined in terms of planning horizons 2 and 3. Those results (not reported here) were very similar to the results presented in Table VII.1.1

The regression's R^2 value of 0.2067 indicates that just over 20% of the variation in the model's dependent variable is explainable in terms of the regressors. While this proportion may seem "low," it should be borne in mind that the dependent variable is defined as the price of each sample lot's cattle *expressed as a departure from the region's average cattle price for the day of purchase.* Thus, a considerable portion of the variation in lot prices is already removed; this regression seeks to explain the residual variation. Collectively, the explanatory variables contribute significantly to the explanation of the variation in the dependent variable: The F value of 55.797 enables a rejection, at the 0.01% significance level, of the hypothesis that all parameters (other than the intercept term) are zero.

The estimate of the coefficient of HEAD is significantly positive. Other things equal, packers pay higher prices for spot market cattle sold in larger lots; perhaps because the purchase of a few large lots reduces transactions costs relative to the alternative of buying numerous small lots. The effect is relatively small, however. Average lot size in the sample was 190 head with a standard deviation of 127 head. The coefficient estimate predicts that an increase in lot size by one sample standard deviation would increase the price of cattle by about $0.04/cwt.

The estimate of the YIELD coefficient is significantly positive. The implication of the regression results is that higher-yielding cattle are paid higher live-weight prices, but lower prices on a $/cwt. carcass basis. The sample's average value of YIELD is about 63.79%. A lot of cattle yielding 1 percentage point higher than average (roughly the standard deviation of the sample's distribution of YIELD values) would receive a price $0.12/cwt. higher than average on a live-weight basis, but $1.38/cwt. lower than average on a carcass-weight basis.

The estimate of the coefficient of PCTPC was positive but statistically insignificant. This was a surprising result. We had expected that the percentage of the lot grading prime and choice would have been positively correlated with price, other things equal. Results suggest that the findings with regard to the price effects of PCTPC are sensitive to the definition of price and the sample used. For example, in the price regression reported in Table VI.1.2, with FOB feedyard price as a dependent variable and using the sample of live-weight-priced spot market cattle purchased by the estimated coefficient of PCTPC is significantly negative. On the other hand, in the price regression reported in Table VI.2.1, with delivered hot cost as the dependent variable and using the sample of all spot, marketing agreement, and forward contract lots, the estimated coefficient of PCTPC is strongly significantly positive.

The estimate of the coefficient of the percentage of the lot achieving yield grades 1, 2, or 3 is significantly positive. The value of the point estimate implies that a one sample standard deviation increase in PCTYG13 (about 6 percentage points) is rewarded with an additional $0.10/cwt.

The average distance cattle were shipped to the plant was 60 miles with a standard deviation of 61 miles. The estimates of the coefficients of MILES and MILES2 combine to imply that a lot of cattle shipped a distance that is one standard deviation greater than the mean distance would, other things equal, be paid about $0.11/cwt. less than a lot shipped the mean distance.

Dummy variables identifying lots of heifers and mixed lots (including steers and heifers) were included to allow for the possibility that such lots might receive a price that is discounted relative to the price paid for steers. The estimates of the coefficients of these dummy variables are difficult to interpret in isolation, however. The estimate of the coefficient of HEIFER, -8.96, when taken at face value, implies that a lot of heifers would suffer a very large price discount of nearly $9.00/cwt. relative to a lot of steers, *other things equal.* This comparison is not particularly meaningful, however, because other things, notably average carcass weight, typically are not equal for steers and heifers.

A very small proportion of the lots in the sample (about 0.03%) were priced on a carcass-weight basis instead of a live-weight basis. The significantly negative estimate of the coefficient of CARCASS implies that these lots suffered a $1.42/cwt. discount relative to otherwise-comparable lots priced on a live-weight basis. Carcass-weight pricing is generally reserved for the relatively few lots for which the ultimate yield is thought to be particularly unpredictable on the purchase date. The estimate of $1.42/cwt. can be thought of as a discount applied to cattle, not for low yield (because that is separately accounted for through the inclusion of YIELD in the regression equation), but for uncertainty with respect to yield.

Because ideal carcass weight differs with the sex of cattle, the variables average carcass weight and the square of the average carcass weight were included separately for lots of steers, of heifers, and of steers and heifers mixed. Estimates imply that the highest-valued carcass weights were 750.60 lb., 660.77 lb., and 694.88 lb. for steer lots, heifer lots, and mixed steer and heifer lots, respectively, with, in each case, drop-offs in value for heavier and lighter carcasses. This appears to be roughly consistent with packer preferences as reflected in many marketing agreement pricing formulas. The formula, for example, uses a base carcass characterized, in part, by the weight range 550 - 945 lbs., with discounts applied to both heavier and lighter carcasses.

The estimates of the coefficients of the three plant dummy variables show that, other things equal, prices paid by were insignificantly different from prices paid by the ;, while prices paid by the Monfort and IBP plants were $0.14/cwt. and $0.27/cwt. lower, respectively. These estimates include the effects of any not-otherwise-accounted-for plant-specific factors including the plants different average propensities to employ non-cash procurement methods.

The estimates of the coefficients of the purchase-day-week dummy variables ranged in magnitude from less than $0.01/cwt. to about $0.035/cwt., but none achieved statistical significance at conventional levels. Controlling for the other factors represented in the regression equation, there appear to be no significant differences in prices paid across days of the week.

Finally, the regression equation also included a set of purchase week dummy variables for 60 of 61 of the weeks represented in the sample. The estimates (not reported in Table VI.1.1) of the coefficients of these variables ranged in magnitude from -$0.36/cwt. to +$0.57/cwt. with several achieving significance at the 5% level or better.

Appendix D: Interpretation of the price regression used in the analysis of hypothesis 4.

The dependent variable in the price regression is HOTCOST, the lot's total delivered cost divided by total hot weight, measured in $/cwt. Data consist of 24,361 lots of fed cattle purchased by the four plants over the sample period. The regression's "F value" is significant at the 0.01% level, indicating that one can confidently reject the hypothesis that the set of explanatory variables, as a group, is irrelevant to the determination of HOTCOST. Indeed, variation in the explanatory variables accounts for about 90% of the lot-to-lot variation in HOTCOST. ($R^2 = 0.9011$) The individual parameter estimates are of predictable signs and most are significant at the 0.01% level. We turn now to an interpretation of each parameter estimate.

The estimate of the coefficient of lot size is significantly positive. Other things equal, packers pay higher prices for cattle sold in larger lots; perhaps because the purchase of a few large lots reduces transactions costs relative to the alternative of buying numerous small lots. The effect is relatively small, however. Average lot size in the sample was 180 head. The regression results predict that a lot of double average size would sell for only $0.13/cwt. more than an otherwise identical lot of average size.

The estimate of the YIELD coefficient is very strongly significantly negative. Evidently the live weight pricing employed in over 90% of the sample's spot market purchases does not fully "reward" high-yielding cattle: Other things equal, high-yielding cattle are paid a live-weight-delivered price that is less than commensurately higher than the price paid to low-yielding cattle, with the result that hot cost (delivered price per pound carcass weight) is actually lower for high-yielding cattle. The effect, moreover, is not insignificant in magnitude. In our sample, the mean of YIELD was 63.69%. A lot of steers with sample average characteristics (including yield) would receive a delivered price of $101.63/cwt. carcass or $64.72/cwt. live. An otherwise identical lot of steers with a yield that was higher by 1 percentage point (roughly the standard deviation of the sample's distribution of YIELD values) would receive a delivered price $0.44/cwt. higher on a live weight basis but $0.89/cwt. lower on a carcass weight basis.

A significantly positive estimate was obtained for the coefficient of the percentage of the lot grading prime and choice combined, PCTPC. A one standard deviation (16 percentage point) increase in the value of this lot quality indicator results in a $0.29/cwt. increase in delivered hot cost.

The average distance cattle were shipped to the plant was 83 miles. The standard deviation of the distribution of miles shipped was approximately 100 miles. The significantly positive estimate of the coefficient of MILES implies that a 100 mile increase in distance shipped results in roughly a $0.10/cwt. increase in delivered hot cost.

Lots of heifers and of mixed steers and heifers are discounted relative to lots of steers by $0.77/cwt. and $1.09/cwt. respectively. Spot market lots priced on a carcass weight basis have a delivered hot cost about $3.27/cwt. lower than otherwise equivalent lots priced on a live weight basis. Generally, carcass weight pricing is reserved for the relatively few lots (about 9% of our sample) for which the ultimate yield is thought to be particularly unpredictable on the purchase date. The estimate of $3.27/cwt. can be thought of as a discount applied to cattle, not for low yield (because that is separately accounted for in the regression equation), but for uncertainty with respect to yield.

The estimate of the coefficient of the percentage of the lot achieving yield grades 1, 2, or 3 is significantly positive. The value of the point estimate implies that a one sample standard deviation increase in PCTYG13 (about 6 percentage points) is rewarded with an additional $0.11/cwt. in delivered hot cost.

The estimates of the coefficients of average carcass weight and the square of average carcass weight are both significant. Together they imply that the highest-valued carcass weighs approximately

660 lbs., with drop-offs in value for heavier and for lighter carcasses. This appears to be consistent with packer preferences as reflected in many marketing agreement pricing formulas. The formula, for example, uses a base carcass characterized, in part, by the weight range 550-945 lbs., with discounts applied to both heavier and lighter carcasses.

The estimates of the coefficients of the purchase day of the week dummies are generally insignificant. Point estimate values suggest that representative prices for Monday through Thursday purchases range from $0.07/cwt. below to $0.09/cwt. above typical Friday prices.

Finally, the price regression also included a set of kill week dummies for the first 66 of the sample's 67 weeks. Although not reported in Table 2, point estimates of these parameters ranged from about -$7.00/cwt., in week 65, to about $21.00/cwt., in week 3. All but two of these parameter estimates were significant at the 0.01% level (in a two-tailed test).

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